these cells, which, presumably, would be the first to suffer in diseased states, are, so far as known at present, either in part assumed by other tissues, or else the cells can endure some injury and still remain physiologically efficient. Endeavors then to elaborate tests along the lines of those discussed in this paper are hardly likely to meet with success, and particularly is this so, since what is required in clinical medicine is not only a means of confirming the diagnosis of an evident malady but especially of detecting a morbid process in its earlier stage.

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# THE MANAGEMENT OF ASTHMA IN CHILDREN.

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The proper care of these cases naturally implies a knowledge of the causes, nature, and clinical varieties of asthma. The diagnosis is certainly more difficult in infants than in adults, as there is no standard whereby there can be any uniformity of opinion as to what is meant by asthma in infants. Undoubtedly many cases go astray under other names, as capillary bronchitis. The writer has often been surprised in thinking he had an acute congestive pneumonia, to find on the following day all symptoms had subsided. After two or three experiences of this kind, in the same child, one will realize he is not dealing with an inflammatory process.

Asthma is a symptom rather than a disease, and has no real pathology in the sense that there is no characteristic lesion constantly present. For this reason it is difficult to give a correct definition. Most succinct is the one given by Holt, namely: Asthma is a vasomotor neurosis of the respiratory tract. All writers agree that neurosis is the important predisposing factor, and in adults it is often the sole cause of an attack. However, in infants and children there is usually some congestion of vasomotor origin or an acute inflammation of the respiratory tract. In 20 cases of which the writer has notes, that have been under his care during the last twenty years, there was but one in which the paroxysms developed without some preceding evidence of catarrhal inflammation.

Three elements probably enter into the immediate cause of the paroxysm.

1. Spasm of the bronchioles; the muscular coat of the small bronchi consists of interwoven layers of longitudinal and circular fibers. The latter are the stronger, and under the influence of stimuli are capable of contraction with consequent lessening of the lumen. Brodie and Dixon have proved that stimulation of the

vagus by pilocarpin or electricity cause symptoms analogous to asthma.

2. Swelling of the mucous membrane lining the smaller tubes, either as an irregular turgescence or an edema, like unto that of urticaria. Further evidence of this is found in the fact that with relief of the paroxysm there is an increased secretion of viscid mucus. This mucus often contains cellular crystalline elements, although the so-called Charcot crystals are less frequent in infants than in adults.

3. The loss of resiliency of the pulmonary air vesicles whereby the residual air increases in volume, with the consequent lessening in the volume of tidal air, producing the partial stasis of air in the lungs. A striking evidence of this is the markedly distended chest, observed in certain cases. It seems to the writer most probable that this is the condition in those cases where there is a marked degree of cyanosis during an attack, and in whom there is evidence of emphysema during the intervals. It is certainly reasonable to believe that these causative elements vary in different cases, or in the same case in different paroxysms. If not, on what hypothesis are we to explain why one case is relieved by morphine, another by adrenalin, and yet another by oxygen?

When we come to study the symptoms it will be found there are three common to all cases, and when these three symptoms are associated they certainly indicate asthma.

1. The periodicity of the attacks, that is, similar attacks recurring in the same patient.

2. The dyspnea, which is expiratory in character, is in marked contrast to inspiratory dyspnea of spasmodic or diphtheric croup.

3. The wheezing breath sounds heard on auscultation and frequently audible at some distance from the patient.

Other symptoms observed in certain cases are distention of the chest, giving a full rounded appearance, the so-called barrel shape. The diaphragm is usually depressed and often fixed or immovable. It will generally be noted that the child is unwilling to talk. Even in infants the countenance has an anxious appearance, and during the severity of the paroxysm the skin is covered by a cold perspiration. The muscular effort in breathing is manifest by the play of the auxiliary muscles.

Upon auscultation there is heard a wheezing stridor, less audible at a distance from the body in infants than in children. Sonorous and sibilant rales are heard over all parts of the chest. The percussion note is usually hyperresonant. The respirations are sometimes below normal in frequency, and often the pause at the end of inspiration is shortened. In infants suffering from asthma, however, the respirations are often rapid as in bronchopneumonia. Indeed, in infants the diagnosis will often hinge upon the sudden relief of the symptoms, and tendency to recurrent attacks. A valuable aid to the diagnosis of asthma in infants, that should be more frequently employed is the blood count. Holt in his textbook makes the following statement: "The blood picture in asthma is characteristic and has much value in the diagnosis. The important thing is the presence of a large number of eosinophile cells. They may form as high as 15 to 20 per cent. of the leukocytes. In a series of cases examined in my clinic by Wile the average was 10.7 per cent. The highest was 26 per cent. The eosinophilia is greatest at the height of the attack. The blood examination serves to differentiate asthma from simple bronchitis and tuberculosis. The existence of the eosinophilia definitely shapes the asthmatic character of these attacks in frequency."

As the management of the individual case will be influenced by the cause, a few words concerning the etiology will aid in the treatment. There is certainly an hereditary tendency. Of the 20 cases that have been under the author's care during the last twenty years, in the greater number there was a history of asthma, either in the ancestors or in the collateral line. In some cases there was a history of some nervous affection, as migraine or epilepsy, and in some cases both a neurotic and asthmatic history, and in others a distinct history of rheumatism in one or other parent. Kerley, in his book on the *Treatment of Children*, attaches much importance to the rheumatic history, and in the treatment of these cases, strongly recommends specific antirheumatic treatment.

Season has a decided predisposing influence. In the writer's experience the attacks are most frequent in the winter and spring. This applies to infants and children more than to adults, for in the latter, attacks are said to be more frequent between fall and spring. The probable reason for this is that attacks in children are usually excited by acute coryzas or bronchitis, and children are more susceptible to these catarrhal conditions during the colder and more changeable months of the year.

There are undoubtedly many exciting or reflex causes that are sufficient to induce the paroxysm, and careful search for the irritation that leads to the attack should be made in each case. There is undoubtedly some relation between asthma and eczema or other skin lesions. The writer has one child under observation who never has asthma when the eczema is active. Diphtheria antitoxin has been known to produce asthmatic paroxysms and the writer has had one personal experience of this kind in the use of antitoxin. In this case an immunizing dose of 500 units induced the paroxysm. In some cases, the paroxysms are undoubtedly caused by acute indigestion, probably due to the absorption of some toxin from the intestinal tract. Fisher, of New York, attaches much importance to this as a cause, and suggests the theory that the pressure against the stomach and diaphragm is sufficient to excite an attack. The influence of adenoids, hypertrophied tonsils, thickened turbinates, and spurs on the septum should receive careful attention. Experience has shown that there are certain sensitive points in the mucous membrane of the nose that reflexly induce asthmatic attacks. However, it does not follow that the removal of these conditions will prevent future attacks. It is a safe rule to follow that if these conditions would demand surgical treatment in other children, they should be treated in asthmatic children. The influence of enlarged bronchial glands in causing asthma in children is difficult to determine, but it is entirely reasonable to believe that these glands may induce such attacks. Indeed, any abnormal condition in any part of the body that might in any way act as an irritant, should receive careful consideration. Children are less likely to have attacks induced by irritation of the nerve filaments in the respiratory tract, by odors from animals or plants, than adults. Also, they are less likely to be influenced by psychical impressions.

The management of asthmatic children naturally resolves itself into two divisions, namely, the care and treatment of the child during the intervals, and the treatment during the paroxysm. The asthmatic child is entitled to fair play. Each case, therefore, should receive a thorough examination, including an inspection of the entire body, noting any physical defect, with careful examination of the nose and throat. A thorough investigation should be made of the nervous and digestive systems including the diet, mode of eating, and, indeed, a physical examination of all the vital organs. An examination of the urine and a blood count should be made in each case. The history of the child and family should always be obtained. In this way valuable hints as to treatment are usually ascertained. It should be borne in mind that the treatment is directed to the patient rather than to the disease. For example, in one of my patients the only abnormal symptom gathered from a careful examination was the presence of indican in the urine. Having gathered all the facts obtainable, a careful outline of treatment, including diet, habits of the child, etc., should be specifically given to the mother. As to clothing: I would simply urge two points, namely, that the feet and legs should always be kept warm and dry, and the chest and neck properly protected to prevent catching cold. In most cases, I have found specific directions as to the diet necessary to the progress of the case. Generally a low meat diet with a high vegetable proteid. In cases induced by intestinal trouble, the diet should contain green vegetables and fruit juices. As has already been indicated, in the majority of cases the paroxysm has been induced by an acute attack of bronchitis. Hence, it is important in all cases that the mother should take prompt measures for relief upon the first symptom of a cold, as sneezing or coughing. My rule is that the child is to be put promptly to bed, have the diet restricted to liquid foods, and given an active cathartic to move the bowels freely. Medication will naturally vary in individual cases, but hot drinks are always indicated. I have one patient in whom a dose of quinine certainly aids in aborting a cold, and another patient in whom a dose of quinine will induce a paroxysm. This has been proved several times.

There are certain cases that fail to respond to our best efforts, and in these cases a change of climate is necessary. This is often a serious problem because a change of climate may mean a change of location for the parents. From my experience in 2 cases, a change of climate for one winter was sufficient, and these cases returned to their homes and have passed several winters without recurring attacks. The writer has known of cases where a change in location of only a few miles has been sufficient to prevent the attacks. It is impossible to explain, on rational grounds, why this is true. If there is simple anemia, suitable treatment should be instituted. In cases where there is a history of rheumatism, either in the child or parents, appropriate treatment should be adopted. An instructive case of this kind will be found in Kerley's work on the *Treatment of Children*. The writer has had one case showing the benefit derived from this line of treatment. Two years have now passed without an asthmatic attack. The writer firmly believes in a system of pulmonary gymnastics for asthmatic children. The mother is instructed to give the child daily exercises in deep breathing. These exercises are to be given at regular hours, with special emphasis laid upon the importance of complete expiration. This is particularly valuable in those children in whom there is a vesicular emphysema as a result of the asthma. These children should avoid running up hill, and all violent exercises. In these cases, I wish to strongly recommend an elastic binder, worn around the chest and held in place by means of shoulder straps. This should be tight enough to exert a constant slight pressure. Its value resides in the fact that the pressure aids in expiration. Any intelligent mother can easily make this binder. The writer has personal experience with its use in 2 cases.

In many cases there is a catarrhal bronchitis, persisting after the cessation of the acute paroxysms, often with wheezing on slight exertion, and it is important to clear up this condition. In these cases the writer has found decided benefit from the use of sodium iodide. The remedy should be continued for several weeks. It should be given in doses of from 2 to 4 gr., three times daily, after meals, in essence of pepsin. There are other cases with cough, but without the nervous element, who are greatly benefited by the syrup of hydroiodic acid. The U. S. P. formula may be given in doses of from 10 to 20 minims. This is of special value where there is a general adenopathy or evidence of enlarged bronchia glands. This remedy I have given in several cases and am convinced of its value. It is more acceptable to the stomach than other preparations containing iodine.

Treatment of the Paroxysm. "The utter capriciousness of asthma in its response to the action of drugs, renders our course largely empirical, so that in many cases, in hope of finding one that will succeed at last, one drug after another is tried only to be discarded as useless."[1] While it is to be hoped that the modern study of anaphylaxis will shed light on prevention and treatment of asthmatic attacks, for the present, at least, the physician must be guided by clinical experience. While there is little danger to life in an acute attack, yet there is real suffering to the patient and anxiety to the parents, who naturally look to the physician for relief. In my experience the fumes from the various asthma powders do not give relief to infants, but on the contrary often aggravate the symptoms by increasing the cough. The room should be warm. Air currents are to be avoided. The condition may be made worse by changing from a warm to a cool room. At the same time fresh air is necessary. Ventilation may be had from an adjoining room rather than from open windows in the room. Only necessary attendants should be allowed in the room. If the bowels are distended with gas they should be relieved promptly by a warm enema. If the paroxysm occurs soon after a hearty meal, then a prompt emetic will afford relief.

In the writer's opinion the following cases illustrate the value of different remedies, and seem to prove that one drug will not relieve all cases. In 2 cases, the writer has given adrenalin solution hypodermically. In both cases the relief was so prompt as to leave no doubt as to the value of the remedy. On the other hand, the writer has seen it utterly fail. The dose for infants is from 3 to 5 minims of the $\frac{1}{100}$ solution of adrenalin chloride.

The writer has attended one little patient a number of times, without any remedy giving relief, until morphine sulphate, $\frac{1}{30}$ grain, was tried. Then in subsequent paroxysms this drug gave relief each time it was given. In another case chloral hydrate gave prompt relief. Other remedies had been given by me in previous attacks. In that case, 3 grains were given and the dose repeated in an hour. After the second dose this child was enabled to lie down and breathe with comfort. In one of the most severe cases the writer has ever seen the inhalation of nascent oxygen gave quick relief. This child was cyanotic, with cold, clammy skin, and short, panting breathing. The attacks came on without any preceding evidence of bronchitis. The oxygen was administered during three separate paroxysms, and always with prompt relief. In this particular case the attacks ceased at the age of five years and only recurred in a lighter form at the age of eighteen years. At the time this patient was under my care a local druggist had an apparatus for the extemporaneous preparation of oxygen, so that it was possible to apply the remedy promptly.

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[1] Osler's System, iii, 720.

In Osler's *System* the use of atropin hypodermically is recommended in doses sufficiently large to produce the physiological effect, but the writer has had personal experience with the remedy in only one case. The skin became flushed, but without marked relief.

There are cases in which after the severity of the paroxysm is relieved there remains a cough, with more or less wheezing and short breathing on exertion, that requires further attention. Here the use of heroin in a syrup of hypophosphites will often benefit by relieving the cough. In some cases in which the cough disturbs sleep, a single dose of antipyrin given at bedtime, will allay the cough and induce quiet sleep. The writer distinctly recalls 3 cases in which this remedy acted well after there had been no benefit from other drugs.

It is difficult to estimate the value of inhalations, but where there is a dry, teasing cough this treatment should be employed. The value of the treatment resides in the fact that the inhalation of moisture promotes expectoration. The use of a croup kettle is necessary, as it is neither possible nor best to saturate the room with steam. A number of remedies may be used in the steam. The writer prefers a combination of creosote and oil of eucalyptus, one teaspoonful of the mixture in a pint of water. The use of this combination with an improvised croup tent, for one-half hour at a time, and repeated two or three times in twenty-four hours, will often soften the cough and induce expectoration. Inhalations of lime water also will be of benefit.

Following the paroxysm of asthma, and until the cough is relieved, these children should receive very careful general care, including a restricted diet, attention to elimination, and careful regulation of the temperature and ventilation of the room, and proper covering to the body on going outdoors.

CONCLUSION. Basing my experience upon the study of the 20 cases mentioned in this paper, it is correct to affirm that the majority of infants and children suffering from asthma, ultimately recover. The writer has recently received reports from 10 cases that had been under his care in past years. In 8 cases there had been no return of asthma, and in the other 2 the paroxysms were lighter than in former years. The frequency and severity of the paroxysms can in a large measure be controlled by proper care and treatment. A limited number develop an emphysema, and as a result their general growth is permanently impaired. This is the most serious sequel of asthma, and because of this, all cases should receive prompt treatment, with a view of lessening the severity and frequency of the paroxysms. The general care of asthmatic children is important, because in most cases a careful study will reveal some exciting cause that can be removed, or some morbid condition, as constipation or indicanuria, that can be corrected. Attention to these suggestions with diligence in discovering and removing other possible causes, will enable many asthmatic children to enjoy comparative freedom from attacks, and to develop into happy, useful citizens.

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# THE TREATMENT OF FRACTURES OF THE FOREARM, WITH NOTES OF THE END RESULTS OF 52 CASES TREATED WITHOUT OPERATION.[1]

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Nearly four years ago, in a paper discussing the end results of 61 cases of fracture of the femur, treated without operation, which was presented before this Academy,[2] it was stated that it seemed incumbent on those surgeons who advocated operative treatment as a matter of routine in cases of recent fracture "either to demonstrate the evil results which they regard as a necessary consequence of accepted" (that is, non-operative) "methods, or to bring forward proof that by operation still better results can be obtained, and without unjustifiable risk to the patient." It was further stated: "The advocates of operative treatment, in short, should either be able to show that the methods they propose will not increase the immediate mortality and will greatly diminish or altogether prevent the unfavorable results of conservative treatment; or, failing this, they should at least convince conservative surgeons that the functional results of the accepted forms of treatment are such as can no longer be tolerated."

To our knowledge no series of cases has been published, of fractures of any long bone in the body, demonstrating either the inadequacy of conservative measures or the superiority and equal safety of operative treatment. It is to show that a fairly large series of cases of fracture of the forearm, involving both bones

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[1] Read before the Philadelphia Academy of Surgery, February 5, 1912.

[2] Ashhurst and Newell, Annals of Surgery, 1908, ii, 748.